CLAIMS

What is claimed is:

1. A data storage device, comprising:

a closed interior space containing a noble gas;

a plurality of electron emitters having emission surfaces exposed within the interior space, the electron emitters adapted to emit electron beams; and

a storage medium contained within the interior space in proximity to the electron emitters, the storage medium having a plurality of storage areas that are capable of at least two distinct states that represent data, the state of the storage areas being changeable in response to bombardment by electron beams emitted by the electron emitters.

2. The device of claim 1, wherein the noble gas is neon gas.

3. The device of claim 1, wherein the interior space is maintained in a vacuum.

4. The device of claim 3, wherein the vacuum is less than approximately 10^{-6} Torr.

5. The device of claim 4, wherein the vacuum is greater than approximately 10^{-3} Torr.

6. The device of claim 1, wherein the electron emitter comprises a field emitter.

7. The device of claim 1, wherein the electron emitter comprises a flat emitter.

8. A data storage device, comprising:

a closed interior space;

a plurality of electron emitters having emission surfaces exposed within the interior space, the electron emitters adapted to emit electron beams;

a storage medium contained within the interior space in proximity to the electron emitters, the storage medium having a plurality of storage areas that are capable of at least two distinct states that represent data, the state of the storage areas being changeable in response to bombardment by electron beams emitted by the electron emitters; and

means for removing contaminants from the emission surface of the electron emitter.

9. The device of claim 8, wherein the means for removing contaminants from the emission surface comprise noble gas provided within the interior space.

10. The device of claim 9, wherein the noble gas is neon gas.

11. The device of claim 8, wherein the interior space is maintained in a vacuum.

12. The device of claim 11, wherein the vacuum is less than approximately 10^{-6} Torr.

13. The device of claim 11, wherein the vacuum is greater than approximately 10^{-3} Torr.

14. The device of claim 8, wherein the electron emitter comprises a field emitter.

15. The device of claim 8, wherein the electron emitter comprises a flat emitter.

16. A method for storing data, comprising the steps of:

forming a data storage device including an interior space;

providing a noble gas within the interior space; and

sealing the interior space such that the space is maintained in a vacuum.

17. The method of claim 16, wherein the noble gas comprises neon gas.

18. The method of claim 16, wherein the data storage device includes an electron emitter adapted to emit electron beams and a storage area that is capable of at least two distinct states that represent data.

19. A method for removing contaminants from an emission surface of an electron emitter of a data storage device, comprising the steps of:

providing a noble gas within an interior space of the data storage device to which the emission surface is exposed;

exciting atoms within the gas by impacting them with an electron beam emitted by the electron emitter;

wherein the atoms of the gas are ionized by impact with the electron beam and accelerated toward the emission surface to sputter remove the contaminants from the emission surface.

20. The method of claim 19, wherein the noble gas is neon gas.